

Seasonal Changes in the Flocking Behaviour of Indian Myna
Aeridotheres tristis (Linnaeus)

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ABSTRACT

The flocking behaviour of Indian mynas *Acridotheres tristis* (Linnaeus) was studied during June 1973 to July 1981 at Pune. Monthly data on the different sizes of flocks with respect to their time of arrival was collected at all the nineteen communal roosts under observations. The composition of various flock-sizes was found to fluctuate monthly and seasonally but showed definite yearly trends. In general, it was noticed that the pair is a basic unit of flock in the population of mynas. The flocks in the feeding arena and changes in the composition of various flock-sizes on the directional routes of a specific communal roost have been described in the paper. A definite relation was observed between the flock-size pattern and the roost-size.

Introduction

The Indian myna, *Acridotheres tristis* (Linnaeus) [Sturnidae: Passeriformes] is a familiar bird distributed over the entire Indian sub-continent. It is an omnivorous and hole-nesting bird. Mynas are sociable in their habits. In all the seasons, they roost communally at night in large groups either independently or forming a mixed roost along with some other species of birds. Apart from the detailed study by Counsilman (1974), some observations on population, flock-size and roosting behaviour of the mynas have been reported by Coleman (1945), Gadgil and Ali (1975), Feare (1976), Greig-Smith (1982) and Sengupta (1982). There is, however, very little information on flock structure and related behaviour of mynas. The present paper deals with observations on the various aspects of flocking behaviour of Indian mynas at Pune (Maharashtra).

Materials and Methods

Altogether nineteen communal roosts located in Pune (18° 30' N. and 73° 53' E).

were censused for studying flock behaviour of mynas. These roosts were designated by definite numbers R-I to R-XIX for the convenience of recording the observations. At all these roosts, different sizes of arriving flocks and the number of mynas therein were counted with respect to their time of arrival in the evening. These observations were carried out once in each month from June 1973 to August 1976 at each roost at successive 5 min intervals roughly between 16.45 and 19.30 hrs. In addition to this, the observations were made in the mornings between 05.00 and 07.30 hrs fortnightly at two communal roosts R-III and R-IV for a fixed period from August 1975 to September 1976. These pre-roosting and post-roosting flocking behavioural observations were repeated for confirmation at roost-IV during August 1980-July 1981.

The roost R-I (biggest population size and largest feeding arena) was selected for a detailed study of the directional routes and also for the number and sizes of flocks of mynas passing by these routes on their return journey in the evening. For this purpose, 21 different spots were designated

on various four circles (A, B, C and D) for observation (Fig. 1a). Each spot was censused for a day beginning from 16th February to 12th March, 1976).

Flock size composition of mynas during day time was studied from April 1974 to September 1975 once a month at three different habitats i.e. the Model Colony, the Poona University campus and Paud Road area (Fig. 1a). The census was carried out by line transect method four times a day at each habitat covering an area of approximately 1 sq km.

Observations and Results

In the annual cycle of Indian mynas the following three distinct phases were observed: the pre-breeding season (November-March); the breeding season (April-July) and the post-breeding season (August-October). After a period of rest, mynas slowly become active in the early morning by vocalizing and disperse into the feeding arena. After spending the day time in various activities they slowly start their return journey towards the communal roost in the evening. They arrive in various group-sizes and gather in the vicinity of the roost except in the breeding season when they go directly into the roosting trees for a night communal sleep.

Fluctuations in flock-size composition — The mean flock-size pattern was determined for each month and season from the data collected at all the nineteen communal roosts during the period of observations and have been shown in Table 1. It indicates that the composition of various flock-sizes fluctuate monthly and seasonally. There were definite yearly trends in the flock-size composition which were repeated

in all the three successive years, viz. 1973-74, 1974-75 and 1975-76 (Table 1).

In all the three seasons mynas predominantly tend to form pairs (Table 1). Such pairs were abundant during the breeding season and particularly in May (on an average 70%). During this season flock-sizes having more than five individuals were minimum. In the post-breeding season, pairs were reduced in number with a simultaneous increase in the number of larger flocks especially those with more than five individuals. In the pre-breeding season, the percentage of paired mynas increased with corresponding decrease in the percentage of bigger-sized flocks in the population of mynas. Throughout the year, solitary individuals were less in the population but tend to increase during the breeding season especially in June and July. Another study undertaken for a period of 14 months in the mornings, when the number of various flock-sizes of mynas leaving the roost R-III and R-IV were counted, it was apparent that the trend in the composition of various flock-sizes of departing birds was similar to that of arriving flocks of mynas. However, at roost R-III, a peculiarity was noticed only during the pre-breeding season that most of the mynas departed from the roost in big-sized flocks (flock-size range was 21 to 150).

The composition of three units (solitary, pairs and flocks of more than three individuals) of arriving mynas in the evening on four particular days in three different seasons were analysed to determine the spread of flock-sizes at 15 minutes interval at roost R-III (Fig. 2). In the pre-breeding season pairs were dominant in first half

TEXT-FIG. 1 — (a) Directional routes followed by flocks of mynas roosting at R-I. (b) Diagrammatic representation of morning and evening movements of mynas on main and sub-directional routes specific to a communal roost.

TEXT-FIG. 1

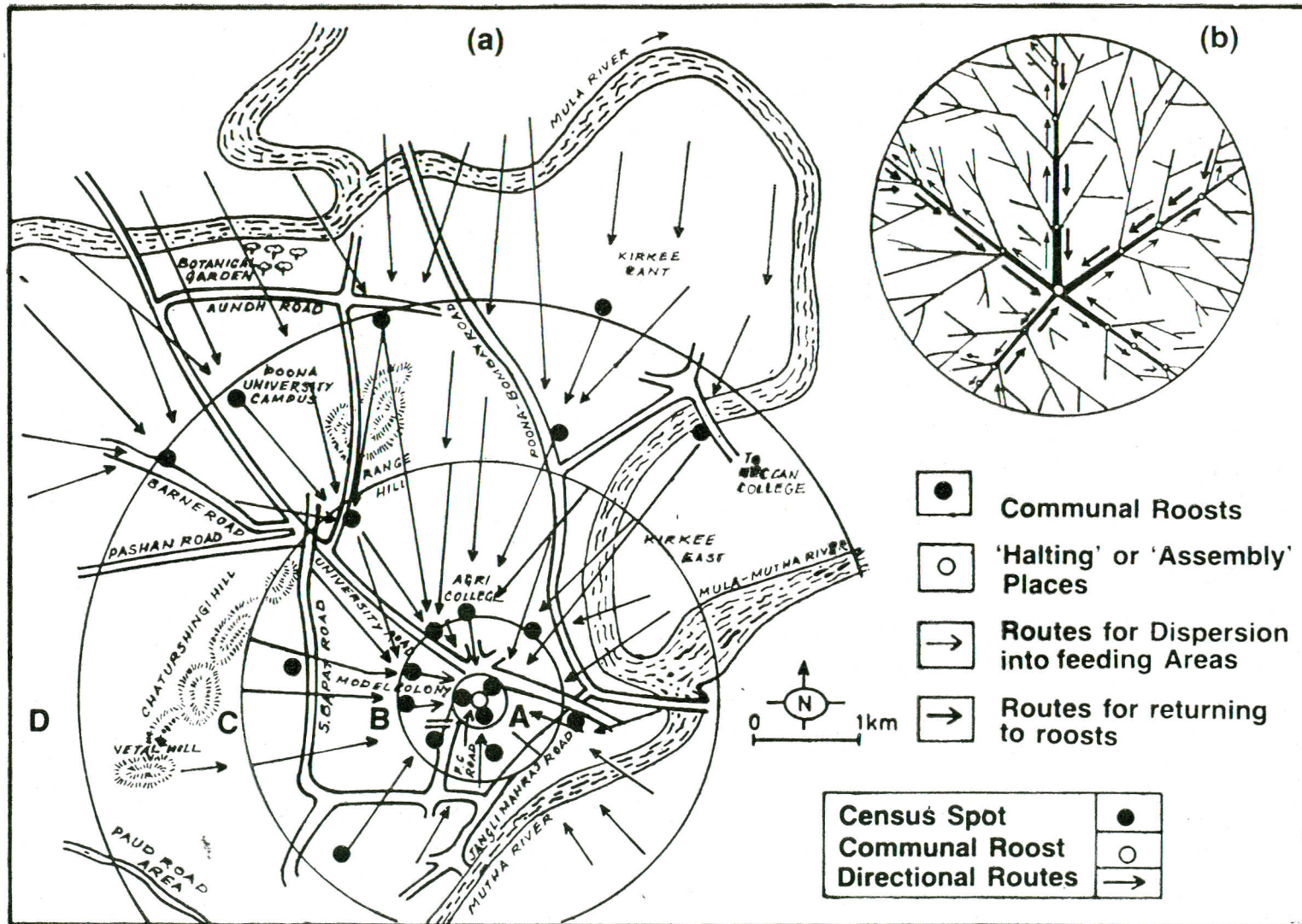


Table 1 — Monthly and Seasonal Changes in the Flock-size Composition of Mynas During Three Observational Years (Mean of All Roosts)

YEAR AND SEASON	RELATIVE PERCENTAGE OF FLOCK-SIZES IN DIFFERENT MONTHS AND SEASONS																	
	1973-74												1974-75			1975-76		
	POST-BREEDING				PRE-BREEDING				BREEDING				POST-BREED- ING	PRE-BREED- ING	BREED- ING	POST-BREED- ING	PRE-BREED- ING	BREED- ING
	A	S	O	N	D	J	F	M	A	M	J	J						
1	5.5	6.0	6.0	3.5	3.2	3.5	4.7	3.5	2.7	4.2	13.8	10.6	6.0	3.5	10.1	5.5	3.8	8.2
2	33.0	35.4	38.0	46.2	47.0	48.3	47.4	48.2	49.0	66.6	53.0	46.0	36.4	48.6	58.5	40.8	48.6	62.1
3	11.0	11.7	11.0	9.4	9.0	7.4	7.0	6.2	6.0	6.2	7.4	8.6	11.4	7.4	6.6	8.1	5.5	5.8
4	12.0	12.6	10.4	14.0	13.2	13.6	12.8	12.4	11.8	8.0	7.9	12.0	12.8	11.4	9.6	12.1	11.0	9.4
5-6	9.4	10.0	9.0	8.1	7.5	7.0	7.5	6.9	6.0	6.0	6.3	7.4	9.4	7.0	6.8	11.5	7.2	6.7
7-10	10.8	10.6	9.0	9.2	8.7	8.6	9.6	10.2	11.2	3.6	5.6	6.6	7.7	9.0	4.1	7.7	8.8	3.2
11-15	7.0	4.1	5.6	3.4	3.9	3.6	3.0	4.5	7.1	3.0	4.0	4.6	4.5	4.1	2.3	4.9	3.3	1.2
16-20	3.0	3.0	4.8	2.3	2.5	2.8	2.4	2.3	3.0	1.4	2.0	2.2	2.8	2.5	1.0	4.9	3.7	0.8
>21	8.3	6.6	6.2	3.9	5.0	5.2	5.6	5.8	3.2	1.0	0.0	2.0	9.0	6.5	1.0	4.5	8.1	2.6

whereas flocks were dominant in second half of arrival time. In the beginning of breeding season (April-May), the pairs were dominant throughout the arrival time. As compared to other seasons, there was a predominance of solitary individuals in the middle of breeding season (June), and they were more in number in the last 15 minutes of arrival. In the post-breeding season flocks were more or less dominant. The trend in the spread of flock-sizes in relation to time in the departing population of mynas in the morning at roost R-III was found to be generally similar to that of arriving population in the evening (Fig. 3). However, two peculiarities were noticed. In the breeding season (June), solitaires predominated in the first 5-10 minutes in the departing population in the morning (Fig. 3) whereas, they predominated in the last 15 minutes in the arriving population of mynas (Fig. 2). Secondly, in the pre-breeding season there was dominance of flocks throughout the departing time.

All the above morning and evening post- and pre-roosting flocking behavioural observations were repeated at roost R-IV during August 1980-July 1981. It was confirmed that similar monthly and seasonal trends exist in the flock-size composition of mynas from year to year.

Flocks in feeding arena and on directional routes—The assessment of the relative flock-size composition of mynas in the feeding arena during day time at three, different localities in different seasons has been shown in Table 2. In all the seasons the percentage of paired mynas was always higher than those of solitary individuals and flocks. Generally, flocks ranging between 3 and 9 birds were noticed while forming secondary roosts in the afternoon.

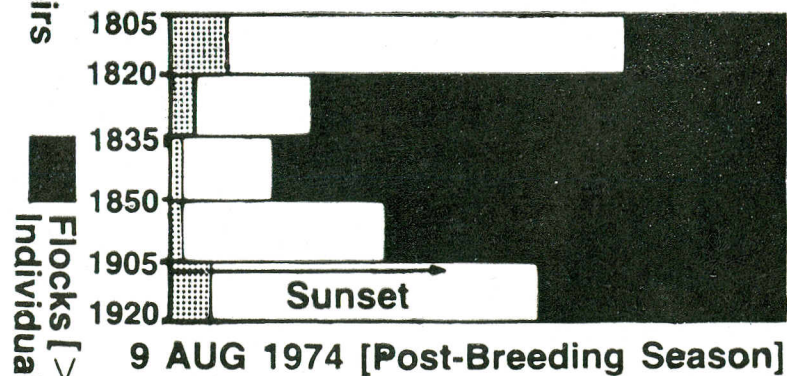
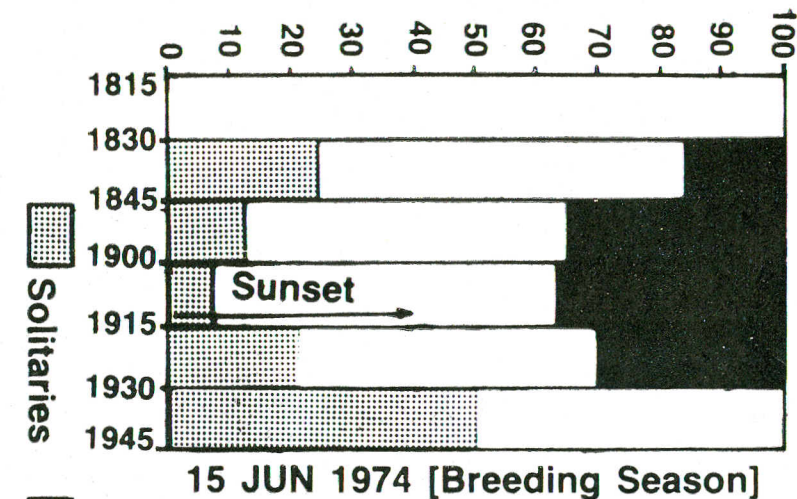
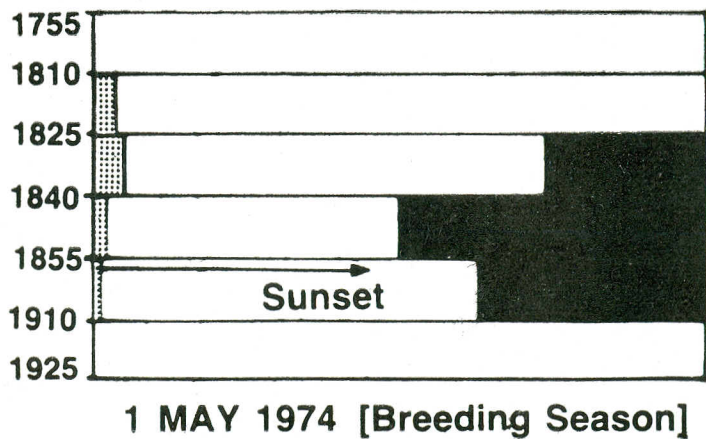
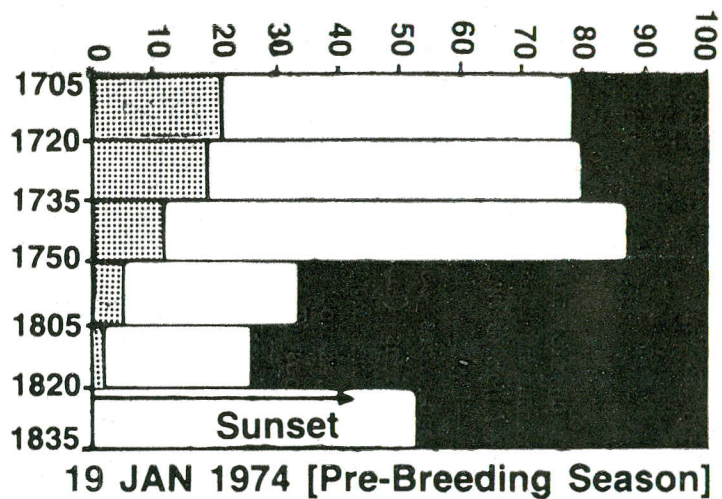
Each spot indicated in Fig. 1a was censused for arriving flock of mynas in the evening with respect to the time of sunset. Mean composition of various flock-sizes at different circles was analysed and computed with the respective median time of arrival (Table 3). It indicates that mynas commenced returning from their feeding arena mostly in pairs. As they approached nearer and nearer to the roost, the number of pairs decreased slowly with simultaneous increase in the bigger-sized flocks. The percentage of large flocks comprising more than 21 birds was highest at the innermost circle 'A'. The mean median time of arrival of returning mynas at different circles changed and reduced as they approached nearer to the communal roost. Further, it was noticed that the bigger-sized flocks departing in the morning from a communal roost, break up along the directional routes and sub-routes and at the halting places situated on these routes. The bigger-sized flocks were however, observed to form along these directional routes and sub-routes and at the assembly places situated on these routes while approaching towards the roost in the evening. Figure 1b depicts a diagrammatic representation of such movements of mynas specific to a communal roost.

Relation between flock-size and roost-size—The population of mynas was studied at each roost for all the three years of observations (Mahabal, 1983). It was, noticed that the population among various roosts was not uniform. There were one major roost (R-I), two medium-sized roosts (R-II and R-III) and the remaining sixteen were small-sized roosts with an average population of 5200, 1200 to 1650 and 180 to 840 birds respectively. Among these roosts when composition of flock-size was

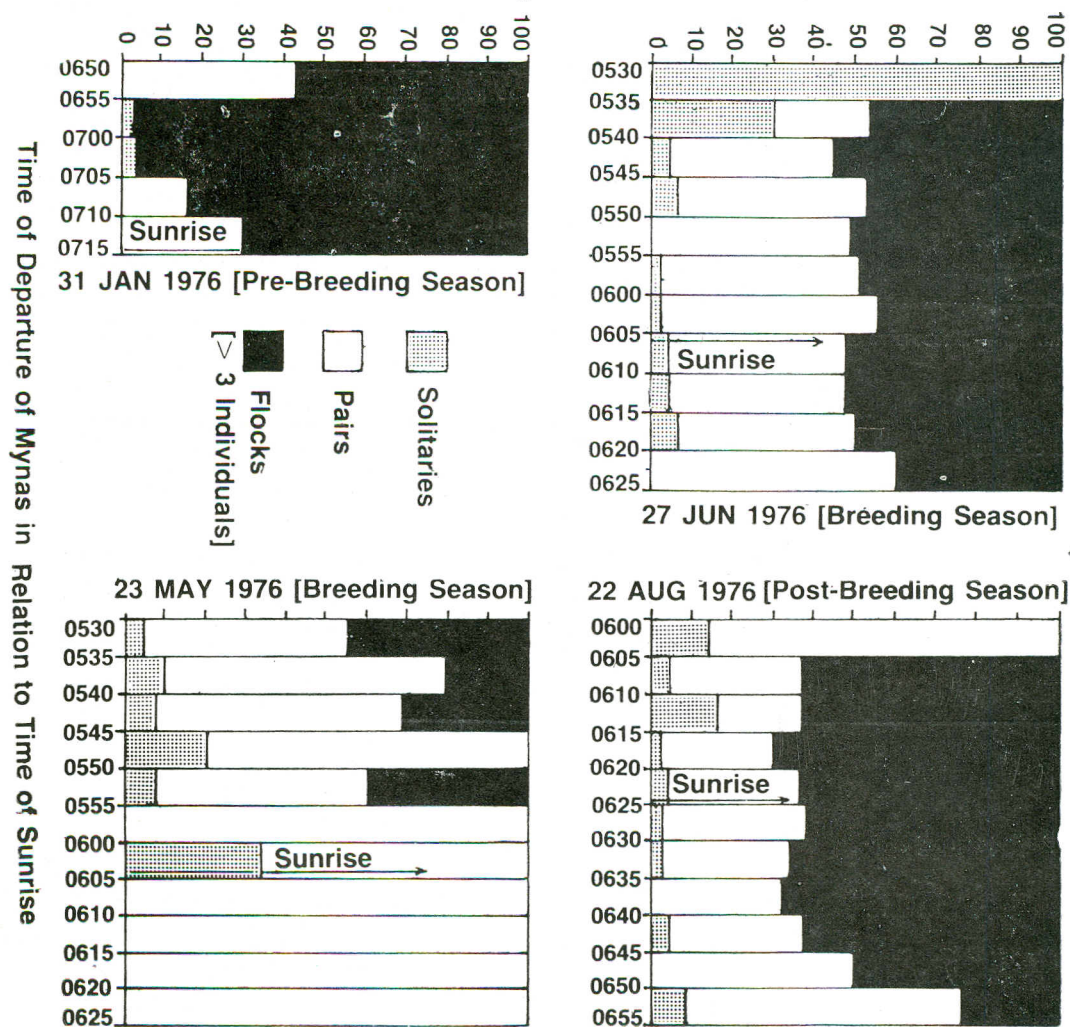
Relative Percentage of Different Flock Sizes

Time of Arrival of Mynas in Relation to Time of Sunset

TEXT-FIG. 2



Relative Percentage of Different Flock Sizes



TEXT-FIG. 3 — Spread of flock-sizes in departing population of mynas at 5-minute interval at roost R-III

Table 2 — Seasonal Changes in Flock-size Composition at Three Different Localities during 1974-75

LOCALITY	RELATIVE PERCENTAGE OF FLOCK-SIZES								
	MODEL	COLONY	AREA	POONA	UNIVERSITY	CAMPUS	PAUD	ROAD	AREA
Flock-Size Season	1	2	3-6	1	2	3-8	1	2	3-9
Breeding	9.6	79.7	10.7	0.0	96.2	3.8	3.5	84.8	11.7
Post-breeding	13.7	77.9	8.4	16.8	77.2	6.0	6.0	84.7	9.3
Pre-breeding	13.2	79.6	7.2	9.3	81.4	9.3	4.9	90.2	4.9

Table 3 — Successive Changes in Flock-size of Mynas Passing through Four Circles while Arriving at the Roost R-I in the Evening

Flock-size	RELATIVE PERCENTAGE OF FLOCKS OF DIFFERENT SIZES							Median time of arrival
	1	2	3	4	5-6	7-20	>21	
Circle								
D	2.8	62.4	0.8	9.8	10.8	13.4	0.0	-23.6
C	1.5	47.0	1.5	11.5	9.4	25.0	4.1	-16.1
B	3.2	52.0	3.7	11.5	9.7	16.8	3.1	-13.6
A	1.8	29.4	3.2	10.7	10.3	28.2	16.4	-9.3

compared, it was noticed that in general, the percentage of paired myna was slightly higher at all the small-sized roosts. At a major roost and both medium-sized roosts, the percentage of flocks of 7 to 20 birds was relatively higher in all the seasons and years of observations as compared to that at the small-sized roosts. Again, at the major roost, the percentage of flock-sizes above 21 birds was higher as compared to that of other roosts. The maximum flock-size reached in the arriving population of mynas was about one hundred birds (at roost R-I). At the medium-sized roosts, the highest flock-size attained was about 70-80 birds, whereas at small-sized roosts it was ranging between 20 and 34 mynas. This clearly indicates that there is a definite relation between the flock-size pattern and the population size of the communal roost.

Discussion

Seasonal changes in the composition of flock-sizes of mynas have shown certain fixed trends. In the breeding season and particularly in May, the percentage of paired mynas was maximum in the population. This may be because of formation of breeding pairs prior to starting of nesting activities. The sudden increase in the number of solitary mynas in June-July could be related to the fact that one of the partner of the breeding pair stays at nest during night, for incubation of eggs, and for rearing and guarding of young ones. Whereas, another partner (probably monogamous male) after completing heavy duties of nesting activities tend to move solitarily and arrives relatively late after sunset at the roost and also leaves the roost well before sunrise to attend the nesting duties.

In other months, the solitary birds could probably be unmated transients (Counsilman, 1974).

The flock-sizes seem to be bigger in the post-breeding season which coincides with the appearance of very large number of juveniles in the population. The juveniles appear particularly prone to join not only their parents (forming family parties of 3, 4 and 5-6 birds) but also shows high attraction towards the flocks. It also enables them to learn, in this season, the landmarks and the routes between the roosting place and the feeding arena by following the adults. Further, it is in this season, the stationary mynas on the ground and on the trees have tendencies to join the flocks of mynas flying over head, resulting in a mass of flocks of birds arriving at the roost. This attraction exerted by the flying flocks increases with the size of the flock. Any flock thus grows at a rate proportional to its size.

In the pre-breeding season, the percentage of family parties and small flocks show a little reduction. This may be due to the fact that the juveniles form their own groups by separating from parents and adults. Hence, a simultaneous increase in the percentage of paired birds can be seen. The process of breaking of bigger flocks into smaller units and paired birds further continues in the breeding season.

In general, the data suggest that on an average about 44% to 50% paired mynas can be observed throughout the year. This clearly indicates that a pair is a basic unit of the population of mynas. This fact can be further confirmed by the observations that after departing from the roost in the morning, larger flocks break-up into smaller paired units which ultimately get dispersed into the feeding arena. Such paired mynas were predominant throughout the year, irrespective of feeding habitat. Greig-Smith

(1982) has also noticed that the model group-size was two in Indian mynas. Sengupta (1982) has pointed out that it is a possibility that mynas pair for life.

Although pair is a basic unit of the population of mynas, even then at various times of the day they come together to form the flocks. Formation of 'secondary roosts' in the afternoon, formation of bigger-sized flocks at assembly places and on the directional routes in the evening, gathering before roosting and communal sleep at night is an indication of such flocking tendencies of mynas. Zahavi (1971), Counsilman (1974), Sengupta (1982) and Khera and Kalsi (1986) have clearly indicated that pre-roosting gatherings is adapted to minimise the predation. Further, Zahavi (1971), Ward and Zahavi (1973), Counsilman (1974), Gadgil and Ali (1975) and Greig-Smith (1982) have suggested that communication of information about location of food sources and protection against predators are significant functions of communal roosting. Further, Counsilman (1974) has stated that the communal sleeping, undoubtedly help mynas in maintaining the unity of the juvenile flocks. Likewise, the data reveal that the flocking tendencies of Indian mynas have been evolved not only through mutual attraction but also to get certain benefits in the social system, particularly the avoidance of predation and information about food sources.

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